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**86. Proposed by GEORGE LILLEY, Ph. D., LL. D., Professor of Mathematics, University of Oregon, Eugene, Oregon.**

A gave two notes; one for $a$ dollars at $m$ per cent., and the other for $b$ dollars at $n$ per cent., annual interest. He is to make a monthly payment of $c$ dollars. How much must be endorsed on each note in order to pay them off at the same time? What must be the payment on each if $a=1900$, $b=1800$, $m=6$, $n=7$, and $c=25$?

**Solution by WM. FRED FLEMING, Principal of High School, Denison, Texas.**

One general formula for finding the number of fixed monthly payments required to extinguish a debt which bears interest is as follows:

$$\text{Number of payments}=\frac{\log\left(\dfrac{p}{p-mP}\right)}{\log(m+1)}$$

where $p$=payment, $P$=principal, and $m$=fraction of principal accruing as monthly interest.

In the given problem the number of payments is equal since the notes are to be lifted at the same time. Hence

$$\frac{\log\left(\dfrac{p}{p-10.50}\right)}{\log(\frac{7}{1200}+1)}=\frac{\log\left(\dfrac{25-p}{25-p-9.50}\right)}{\log(\frac{1}{200}+1)}.$$

Whence, using 7-figure logarithms,

$$\frac{p}{p-\frac{21}{2}}=\left(\frac{25-p}{\frac{31}{2}-p}\right)^{1.1662}$$

which equation, solved by double position (or some other method of approximation) gives, as the nearest payments involving *even cents*, $12.74 for the payment on the $1800 note, and $12.26 as payment on the $1900 note.

Number of payments=298.9, or 24 years and 11 months (nearly) will be required to lift the note.

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## PROBLEMS FOR SOLUTION.

### ARITHMETIC.

**136. Proposed by F. M. PRIEST, Mona House, St. Louis, Mo.**

What is the size of the smallest cubical box, inside dimension, that will contain four balls each ten inches in diameter?